

REMARKS

Claims 1, 3-11, and 15-17 are pending. Claims 1, 3, 4, 6-11, and 15-17 stand rejected and claim 5 stands objected to. By virtue of this response, no claims have been cancelled, amended, or added. Accordingly, claims 1, 3-11, and 15-17 are currently under consideration. For the Examiner's convenience, the remarks are presented in the same order in which they were raised by the Office Action.

Claim Rejections under 35 USC § 102

A. Claims 1, 3, 4, and 9 stand rejected under 35 U.S.C. 102(e) as being anticipated U.S. Patent No. 6,542,526 to Niwa et al. (hereinafter "Niwa").

Applicants respectfully traverse the rejection and submit that Niwa does not disclose or suggest a gallium nitride semiconductor light emitting diode as presently recited in claim 1. The Examiner states, *inter alia*, that "Niwa discloses in fig. 23D a gallium nitride (GaN) compound semiconductor light emission device comprising..." (Emphasis added). Applicants disagree and submit that the example identified by the Examiner in Figure 23D of Niwa is a semiconductor laser (see, Niwa: column 30, lines 40-44), and not a semiconductor light emission diode (LED) as recited by claim 1. It would be clear to one of ordinary skill in the art that a semiconductor LED and a semiconductor laser are not the same, and that they have different structures and uses.

The Examiner contends that Niwa discloses a p-type transmissive electrode and an n-type transmissive electrode that "transmit light which is generated in the active layer 55 and reflect from the substrate so that light exits the light emission device." Applicants respectfully disagree. The laser diodes disclosed in Niwa are edge emitting laser diodes, wherein the light which is emitted, is emitted from cleaved facets along the "horizontal" direction. For example, in figure 23D of Niwa the light is emitted out of the plane of the paper (Niwa: column 30, lines 42-43). Therefore, there is no disclosure or suggestion that the substrate reflect light from the active region so that light exits the emission device.

Moreover, given the nature of the device disclosed by Niwa, e.g., a semiconductor laser, there is no suggestion of the features of the present claims because Niwa is not concerned with light which propagates in the vertical direction. In fact, one of ordinary skill in the art would recognize that vertical propagation of light is desirably reduced to improve the output power of the laser device. This is demonstrated more clearly in Nagahama (which also discloses a semiconductor laser device and is addressed below), where Nagahama describes that the cladding layer 14 functions as a carrier trapping layer and a light trapping layer (see, Nagahama: column 18, lines 60-67 and column 21, lines 23-24). With such a semiconductor laser device, light does not pass the cladding layer in the vertical direction, and thus light does not reach the substrate to be reflected as presently claimed.

Further, the Examiner maintains that the recitation in claim 1 that light “reflect[s] from substrate so that light exits the light emission device” is merely a statement of the inherent properties of the structure of Niwa because substantially identical structure or composition is shown. *In re Best*, 195 USPQ 430, 433 (CCPA 1997).” As stated above, claim 1 is directed to a light emission diode and not a semiconductor laser as disclosed by Niwa. Those of ordinary skill in the art will recognize that the structure and operation of a light emission diode and a light emitting laser are different. Accordingly, the combination of structure and material recited in amended claim 1 leads to the feature of light generated in the active layer reflected from the substrate such that light exits the light emission device. Such a feature is neither disclosed nor suggested by the semiconductor laser structure of Niwa and the rejection should be withdrawn.

Further, Niwa does not disclose a “p-type transmissive electrode” as recited by claim 1. The Examiner states that the p-type electrode 58 of Niwa is transmissive; however, Niwa does not disclose or suggest that the p-type electrode 58 is transmissive (Applicants note that the portion of Niwa cited by the Examiner, column 30, line 61, does not disclose or suggest that the p-type electrode 58 is transmissive). Thus, even assuming light is reflected by the substrate of Niwa, Niwa does not disclose that the p-type electrode 58 is transmissive such that the light may exit the device as recited by claim 1.

Claims 3, 4, and 9 depend from claim 1 and should be allowable over Niwa for at least similar reasons as claim 1. Further, with respect to claims 3 and 4, the Examiner asserts that FIG. 23D of Niwa discloses the features of pending claims 3 and 4 in that the “n-type transmissive electrode is located outside and is formed at least partially or completely around a circumference of the p-type transmissive electrode.” The Examiner states that “fig. 23D is the side view of the device and the top view (not shown) would have shown the surrounding structure as claimed.” Applicants submit that the Examiner’s rejection is clearly insufficient. Niwa states, at column 30, lines 40-44, that “FIG. 22 is a perspective view showing a semiconductor laser device.....and FIGS. 23A to 23D are sectional views....” Figure 22 clearly shows that the n-type electrode 59 is only present on one side of the device. Figure 22 also shows that the laser structure is very different from the features of claim 1. Accordingly, for at least these reasons, Niwa does not disclose or suggest the features of claims 3 and 4 and the rejection should be withdrawn.

In regard to claim 9, the Examiner asserts that Niwa discloses that the “n-type transmissive electrode comprises at least one thin metal film.” Applicants respectfully disagree for the following reasons. First, the n-type electrodes of Niwa are not disclosed as being transmissive. Second, Niwa does not disclose a thin metal film; the portion of Niwa referenced by the Examiner states “a metal film made from such as ...” (see column 24, line 51). The Examiner fails to identify what teaching of Niwa discloses or suggests a thin metal film. Accordingly, Niwa does not disclose or suggest that the n-type electrode includes a thin metal film as recited by claim 9 and the rejection should be withdrawn.

B. Claims 1, 3-4, 6-11, 16 stand rejected under 35 U.S.C. 102(e) as being anticipated U.S. Patent No. 6,172,382 to Nagahama et al. (hereinafter “Nagahama”).

Applicants respectfully traverse the rejection and submit that Nagahama does not disclose or suggest a gallium nitride semiconductor light emitting diode as presently recited in claim 1. The Examiner states, *inter alia*, that “Nagahama discloses in fig. 2 a gallium nitride (GaN) compound semiconductor light emission device comprising...” (Emphasis added). Applicants disagree and submit that the example identified by the Examiner in Figure 2 of Nagahama discloses

a semiconductor laser diode (see column 18, lines 11-37), and not a semiconductor light emission diode (LED) as recited by claim 1. It would be clear to anyone skilled in the art that a semiconductor LED and a semiconductor laser are not the same, and that they have very different structures and uses.

The Examiner contends that Nagahama discloses a p-type transmissive electrode and an n-type transmissive electrode that transmit “light which is generated in the active layer 16 and reflect from the substrate so that light exits the light emission device.” Applicants respectfully disagree. The laser diodes disclosed in Nagahama are edge emitting laser diodes, wherein the light which is emitted, is emitted from cleaved facets along the “horizontal” direction (see, for example, figure 2 and column 18, lines 13-14 of Nagahama). In fact, Nagahama discloses a ridge waveguide type laser diode where a ridge extends along the direction of resonance (which is the longitudinal direction along the ridge), “thereby to trap light in the active layer 16 in the transverse direction” (Nagahama: column 18, lines 60-67; emphasis added). See also figure 4 of Nagahama, which shows the longitudinal orientation of the ridge. Therefore, there is no disclosure or suggestion that the substrate reflects light from the active region so that light exits the emission device as recited by claim 1.

Moreover, given the nature of the device disclosed by Nagahama, e.g., a laser diode, there is no suggestion of the features of the present claims because Nagahama is not concerned with light which propagates in the vertical direction. In fact, one of ordinary skill in the art would recognize that vertical propagation of light is desirably reduced to improve the output power of the laser diode. This is clearly demonstrated in Nagahama where the cladding layer 14 is described as a carrier trapping layer and a light trapping layer (see Nagahama: column 21, lines 23-24). This portion describes that light does not pass the cladding layer in the vertical direction, and thus light does not reach the substrate to be reflected as presently claimed.

Further, the Examiner maintains that the recitation in claim 1 of “reflect from substrate so that light exits the light emission device” is merely a statement of the inherent properties of the structure because substantially identical structure or composition is shown. *In re Best*, 195 USPQ

430, 433 (CCPA 1997)." (Emphasis added). As stated above, claim 1 is directed to a light emission diode (LED) and not a semiconductor laser as disclosed by Nagahama. Those of ordinary skill in the art will recognize that the structure and operation of a light emission diode and a light emitting laser are different. Accordingly, the combination of structure and material recited in amended claim 1 leads to the feature of light generated in the active layer reflected from the substrate such that light exits the light emission device. Such a feature is neither disclosed nor suggested by Nagahama and the rejection should be withdrawn.

Further, Nagahama does not disclose "p-type transmissive electrode" as recited by claim 1. The Examiner states that the p-type electrode 21 of Nagahama is transmissive; however, Nagahama does not disclose or suggest that the p-type electrode 21 is transmissive (Applicants note that the portion of Nagahama cited by the Examiner, column 18, line 60, does not disclose or suggest that the p-type electrode 21 is transmissive). Thus, even assuming light is reflected by the substrate of Nagahama, Nagahama does not disclose that the p-type electrode 21 is transmissive such that the light may exit the device as recited by claim 1.

Claims 3, 4, 6-11, and 16 depend from claim 1 and should be allowable over Nagahama for at least similar reasons as claim 1. Further, with respect to claims 3 and 4, the Examiner asserts that FIG. 2 of Nagahama discloses the features of pending claims 3 and 4 in that the "n-type transmissive electrode 23 is located outside and is formed at least partially or completely around a circumference of the p-type transmissive electrode 21, fig. 2, which is the side view of the device and the top view (not shown) would have shown the surrounding structure as claimed." Applicants submit that the Examiner's rejection is clearly insufficient. FIG. 4 clearly shows that the n-type electrode 23 is only present on one side of the semiconductor laser device. FIG. 4 also shows that the semiconductor laser device structure is very different from the features of claim 1. Accordingly, for at least these reasons, Nagahama does not disclose or suggest the features of claims 3 and 4 and the rejection should be withdrawn.

In regard to claim 9, the Examiner asserts that Nagahama discloses that the "n-type transmissive electrode comprises at least one of the thin metal film, column 20, line 57." Applicants

respectfully disagree for the following reasons. First, the n-type electrodes of Nagahama are not disclosed as being transmissive. Second, Nagahama does not disclose a thin metal film; the portion of Nagahama referenced by the Examiner recites various metals that may be used (see column 20, lines 55-58). The Examiner fails to identify what teaching of Nagahama discloses or suggests a thin metal film. Accordingly, Nagahama does not disclose or suggest that the n-type electrode includes a thin metal film as recited by claim 9 and the rejection should be withdrawn.

Claim Rejections under 35 USC § 103

A. Claim 15 stands rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,171,382 to Nagahama in view of U.S. Patent No. 5,309,001 to Watanabe et al. (hereinafter “Watanabe”).

Claim 15 includes similar features as claim 1 discussed above. In particular, claim 15 recites a semiconductor light emitting diode in contrast to the semiconductor laser emitting device disclosed by Nagahama. Moreover, other features of claim 15, such as a p-type transmissive electrode and an n-type transmissive electrode, are not disclosed by Nagahama for at least similar reasons as discussed above. The addition of Watanabe does not cure the deficiencies of Nagahama, nor is Watanabe alleged to cure the deficiencies in the Office Action.

Additionally, the Examiner has failed to present a *prima facie* case of obviousness. Applicants respectfully submit that the Examiner is engaging in impermissible hindsight analysis in making the rejection. In particular, the Examiner has not identified a sufficient teaching, suggestion, or motivation to combine the reference teachings to meet the features of the present claim. In fact, it is clear that there is no motivation to combine Nagahama with Watanabe to obtain a transmissive electrode, as the Examiner asserts, by using a thick film of ITO. As discussed herein, Nagahama discloses a semiconductor laser, where it is generally undesirable for light to propagate in the vertical direction and exit the laser diode device of Nagahama (see, e.g., Nagahama: column 18, lines 60-67). Accordingly, one of ordinary skill in the art would not be motivated to combine the reference teachings as suggested by the Examiner.

Accordingly, for at least these reasons, the rejection should be withdrawn and claim 15 allowed.

B. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,171,382 to Nagahama in view of U.S. Patent No. 6,130,446 to Takeuchi et al. (hereinafter "Takeuchi").

Claim 17 depends from claim 1 and should be allowable over Nagahama for at least similar reasons as discussed above. The addition of Takeuchi fails to cure the deficiencies of Nagahama, nor is Takeuchi alleged to cure the deficiencies of Nagahama in the Office Action. Accordingly, Applicants submit that claim 17 is allowable and the rejection should be withdrawn.

Additionally, the Examiner has failed to present a *prima facie* case of obviousness. Applicants respectfully submit that the Examiner is engaging in impermissible hindsight analysis in making the rejection. In particular, the Examiner has not identified a sufficient teaching, suggestion, or motivation to combine the reference teachings to meet the features of the present claim. In fact, it is clear that there is no motivation to combine Nagahama with Takeuchi to obtain n-type and p-type transmissive electrodes, as the Examiner asserts, by using thin films having a thickness of 30nm or less. As discussed herein, Nagahama discloses a semiconductor laser, where it is generally undesirable for light to propagate in the vertical direction and exit the laser diode device of Nagahama (see, e.g., Nagahama: column 18, lines 60-67). Accordingly, one of ordinary skill in the art would not be motivated to combine the reference teachings as suggested by the Examiner to meet the features of the present claims.

Allowable Subject Matter

Claim 5 stands objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base and any intervening claims.

Applicants thank the Examiner for the indication of allowable subject matter, and in particular, claim 5. Applicants submit, however, that in light of the remarks presented herein all pending claims are now in condition for immediate allowance.

Jiangsu
Chongming
Shanghai
Jiaozhou
Guangzhou
Fuzhou

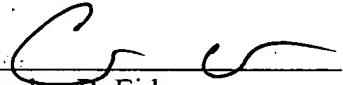
CONCLUSION

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue. If it is determined that a telephone conference would expedite the prosecution of this application, the Examiner is invited to telephone the undersigned at the number given below.

In the event the U.S. Patent and Trademark office determines that an extension and/or other relief is required, applicant petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to Deposit Account No. 03-1952 referencing docket no. 299002051900. However, the Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

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Respectfully submitted,

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